

Sole (*Solea solea*) in Subarea 4 (North Sea)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2022 should be no more than 15 330 tonnes.

ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock.

Stock development over time

Fishing pressure on the stock is above F_{MSY} but below F_{pa} and F_{lim} ; spawning-stock size is above MSY $B_{trigger}$, B_{pa} , and B_{lim} in 2021.

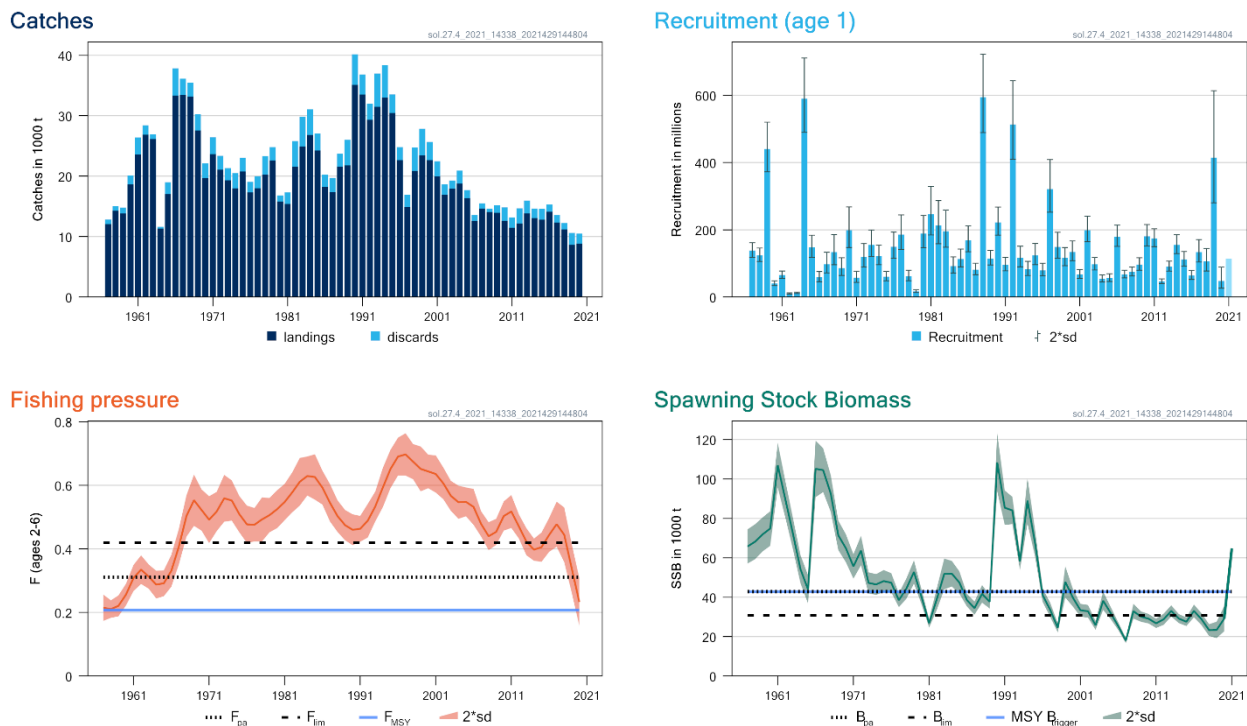


Figure 1 Sole in Subarea 4. Summary of the stock assessment. Estimates of discards are only available from 2002. The assumed recruitment value in 2021 is shaded in a lighter colour.

Catch scenarios

Table 1 Sole in Subarea 4. Values in the forecast and for the interim year. All weights are in tonnes, recruitment is in thousands.

Variable	Value	Notes
$F_{ages\ 2-6}$ (2021)	0.23	Average exploitation pattern (2018–2020), scaled to average $F_{ages\ 2-6}$ in 2020
SSB (2022)	58 617	Short-term forecast (STF)
$R_{age\ 1}$ (2021, 2022)	113 711	Geometric mean of recruitment (GM; 1957–2019)
Total catch (2021)	16 661	STF
Projected landings (2021)	14 825	STF, assuming average landing ratio by age 2018–2020
Projected discards (2021)	1837	STF, assuming average discard ratio by age 2018–2020

Table 2 Sole in Subarea 4. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch* (2022)	Projected landings ** (2022)	Projected discards *** (2022)	F _{total} # (ages 2–6) (2022)	F _{projected} landings (ages 2–6) (2022)	F _{projected} discards (ages 1–3) (2022)	SSB (2023)	% SSB change^	% TAC change ^^	% advice change ^^
ICES advice basis										
MSY approach: F _{MSY}	15330	14215	1115	0.207	0.193	0.041	60339	2.9	-28	-28
Other scenarios										
F = F _{MSY}	15330	14215	1115	0.207	0.193	0.041	60339	2.9	-28	-28
F = F _{MSY lower}	9523	8836	687	0.123	0.115	0.025	65840	12.3	-55	-55
F = F _{MSY upper}	21805	20202	1603	0.311	0.29	0.062	54225	-7.5	2.1	2.1
F = 0	0	0	0	0	0	0	74886	28	-100	-100
F _{pa} (F _{P05} with advice rule [AR])	21805	20202	1603	0.311	0.29	0.062	54225	-7.5	2.1	2.1
F _{lim}	27852	25782	2070	0.42	0.39	0.084	48535	-17.2	30	30
SSB (2023) = B _{pa}	33930	31377	2553	0.54	0.51	0.109	42838	-27	59	59
SSB (2023) = B _{lim}	46859	43217	3641	0.88	0.82	0.175	30828	-47	119	119
SSB (2023) = MSY B _{trigger}	33930	31377	2553	0.54	0.51	0.109	42838	-27	59	59
F = F ₂₀₂₁	17001	15761	1240	0.23	0.22	0.047	58760	0.24	-20	-20
Rollover advice	21361	19792	1569	0.30	0.28	0.061	54644	-6.8	0.00	0.00

* Differences between the total catch and the sum of projected landings and discards result from rounding.

** Marketable landings.

*** Including BMS landings, assuming recent discard rate.

^ SSB 2023 relative to SSB 2022.

^^ Total catch in 2022 relative to the advice value 2021 and TAC (21 361 tonnes).

F_{projected} landings and F_{projected} discards do not add up to F_{total} as they are calculated using different ages.

The change in advice (-28%) is mainly due to the downward revision of the large 2018 year class.

Basis of the advice

Table 3 Sole in Subarea 4. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is aware of the multiannual management plan (MAP) which has been adopted by the EU for this stock (EU, 2018) and which ICES considers to be precautionary. There is no agreed shared management plan with UK for this stock, and ICES provides advice according to ICES MSY approach. Catch scenarios consistent with the MAP F _{MSY} ranges are provided.

Quality of the assessment

The benchmark conducted in 2020 uses additional survey data, covering an important area of the stock distribution. This led to a downward revision of recent SSB estimates and an upward revision of fishing mortality (ICES, 2020a).

The assessment model currently presents a large retrospective pattern in estimated SSB and fishing mortality, which could lead to further revisions in stock status. Possible explanations and solutions for this pattern will need to be investigated.

Between 2014 and 2018, the Dutch beam trawl fleet went through a transition whereby pulse trawls became the main fishery operating in the North Sea (ICES, 2018). Following the EU decision in February 2019 to revise the technical measures regulations, pulse gear will be prohibited from 30 June 2021 and is now being phased out (EU, 2019). This might have caused changes in the selection pattern, which might contribute to the retrospective pattern of the assessment.

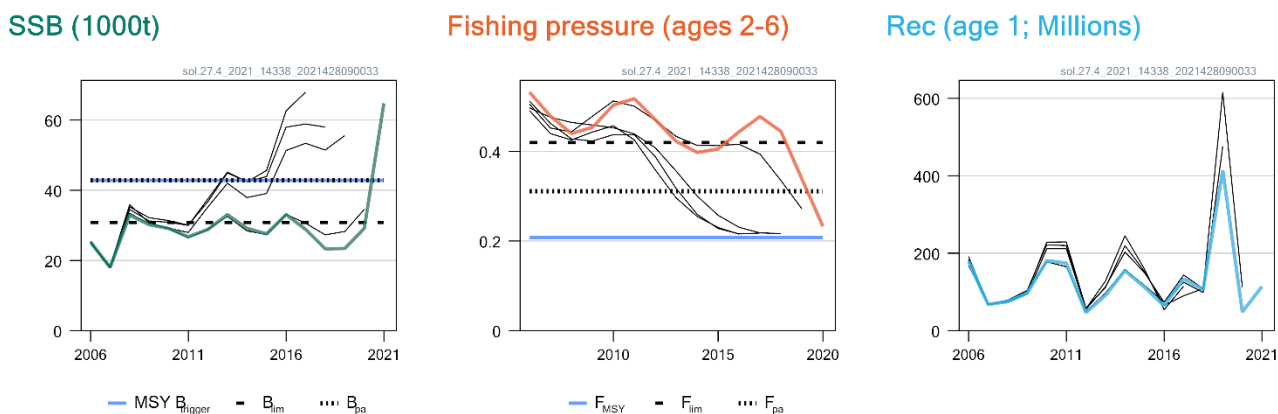


Figure 2 Sole in Subarea 4. Historical assessment results (final-year recruitment included for each line, corresponding to the forecast recruitment in the interim year). The stock was benchmarked in 2020.

Issues relevant for the advice

Below minimum conservation reference size (MCRS, also known as ‘below minimum size’ [BMS]) landings of sole reported to ICES are currently much lower than the estimates of discards, which in 2020 amounted to 15.7% of the total catch based on catch monitoring programmes, a value influenced by the large 2018 year class.

Reference points

Table 4 Sole in Subarea 4. Reference points, values, and their technical basis. All weights are in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	42 838	Default to value of B_{pa}	ICES (2020a)
	F_{MSY}	0.207	EQsim analysis, assuming a hockey stick stock–recruit relationship, based on the recruitment period 1958–2018	ICES (2020a)
Precautionary approach	B_{lim}	30 828	Breakpoint of the hockey stick stock–recruit relationship, based on the recruitment period 1958–2018	ICES (2020a)
	B_{pa}	42 838	$B_{lim} \times \exp(1.645 \times 0.2)$	ICES (2020a)
	F_{lim}	0.420	EQsim analysis, based on the recruitment period 1958–2018	ICES (2020a)
	F_{pa}	0.311	The F that provides a 95% probability for SSB to be above B_{lim} (F_{P05} with advice rule [AR]).	ICES (2020a, 2021)
EU management plan (MAP)*	MAP MSY $B_{trigger}$	42 838	MSY $B_{trigger}$	ICES (2020a)
	MAP B_{lim}	30 828	B_{lim}	ICES (2020a)
	MAP F_{MSY}	0.207	F_{MSY}	ICES (2020a)
	MAP target range F_{lower}	0.123–0.207	Consistent with ranges provided by ICES (2020b), resulting in no more than 5% reduction in long-term yield compared with MSY	ICES (2020a)
	MAP target range F_{upper}	0.207–0.311	Consistent with ranges provided by ICES (2020b), resulting in no more than 5% reduction in long-term yield compared with MSY	ICES (2020a)

*EU multiannual plan (MAP) for the North Sea (EU, 2018).

Basis of the assessment

Table 5 Sole in Subarea 4. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2021a)
Assessment type	Age-based analytical assessment (Aarts and Poos, 2009; ICES, 2021b) that uses catches in the model and in the forecast
Input data	Commercial catches (age frequencies from catch sampling), two survey indices (BTS combined [NL, DE, BE] Q3 [B2453] and SNS Q3 [B3499]). Natural mortality is assumed constant at 0.1 (except for 1963, when it is set at 0.9). Maturity-at-age is assumed to be knife-edged (at age 3) and constant over time.
Discards, BMS landings, and bycatch	Discard data from 2002 are included in the assessment; discards before 2002 are estimated by the model. In 2020, 86% of the landings had associated discarding information, and 77% of the discards were sampled. BMS landings, where reported, are included with discards in the assessment from 2016.
Indicators	None
Other information	The stock was last benchmarked in 2020 (ICES, 2020a). The main change was the inclusion of a single index combining various BTS Q3 surveys (NL, DE, and BE; ICES, 2020a).
Working group	Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK)

History of the advice, catch, and management

Table 6 Sole in Subarea 4. ICES advice, and ICES estimates of landings and discards reported to ICES. All weights are in tonnes.

Year	ICES advice	Landings corresponding to advice	Catch corresponding to advice	Agreed TAC	ICES landings	ICES discards	ICES catch
1987	Rebuild SSB to 40 000 t; TAC	11000		14000	17368		
1988	Increase SSB towards 50 000 t; TAC	11000		14000	21590		
1989	Increase SSB towards 50 000 t; TAC	14000		14000	21805		
1990	80% of F (88); TAC	25000		25000	35120		
1991	SSB > 50 000 t; TAC	27000		27000	33513		
1992	TAC	21000		25000	29341		
1993	No long-term gains in increased F	29000		32000	31491		
1994	No long-term gains in increased F	31000		32000	33002		
1995	No long-term gains in increased F	28000		28000	30467		
1996	Mixed fishery, link plaice advice	23000		23000	22651		
1997	< 80% of F (95)	14600		18000	14901		
1998	75% of F (96)	18100		19100	20868		
1999	$F < F_{pa}$ (80% of F (97))	20300		22000	23475		
2000	$F < F_{pa}$	< 19800		22000	22641		
2001	$F < F_{pa}$	< 17700		19000	19944		
2002	$F < 0.37$	< 14300		16000	16945	1712	18657
2003	$F < F_{pa}$	< 14600		15900	17920	1364	19284
2004	$F < F_{pa}$	< 17900		17000	18757	2181	20938
2005	$F < F_{pa}$	< 17300		18600	16355	1341	17696
2006	Keep SSB above B_{pa}	< 11900		17700	12594	994	13588
2007	SSB above B_{pa}	< 10800		15000	14635	871	15506
2008	SSB above B_{pa}	< 9800		12800	14071	545	14616
2009	Apply management plan	< 14000		14000	13952	1261	15213
2010	Apply management plan	< 14100		14100	12603	2246	14849
2011	See scenarios	-		14100	11485	1703	13188
2012	Apply first stage of the management plan	< 15700		16200	11602	2528	14130
2013	Apply first stage of the management plan	< 14000		14000	13137	2119	15256

Year	ICES advice	Landings corresponding to advice	Catch corresponding to advice	Agreed TAC	ICES landings	ICES discards	ICES catch
2014	Apply first stage of the management plan	< 11900		11900	13060	1568	14628
2015	Apply second stage of the management plan	< 11400		11900	12867	1763	14630
2016	Apply second stage of the management plan		≤ 12800	13262	14127	1205	15332 [^]
2017	Apply second stage of the management plan		≤ 15300	16123	12370	1246 [^]	13616 [^]
2018	Apply second stage of the management plan		≤ 15726	15694	11199	1056 [^]	12255 [^]
2019	MAP* F ranges: F _{lower} to F _{upper} (F = 0.113– .367), but F _{higher} than F _{MSY} = 0.202 only under conditions specified in the MAP		7451–21644, but catches greater than 12801 only under conditions specified in the MAP	12555	8647	1949 [^]	10596 [^]
2020	Management plan		17545 (range 10192–29767)	17545	8863	1652 [^]	10515 [^]
2021	Management plan		21361 (range 13237–32920)	21361			
2022	MSY approach		15330				

[^] Since 2016, discards include BMS landings.

* EU multiannual plan (MAP) for the North Sea (EU, 2018).

History of the catch and landings

Table 7 Sole in Subarea 4. Catch distribution by fleet in 2020 as estimated by and reported to ICES.

Catch (2020)	Landings				Discards
	Beam trawl	Gillnets & trammel nets	Bottom trawls	Other	
10 515 tonnes	94%	2.5%	2.0%	1.5%	1652 tonnes
	8863 tonnes				

Table 8 Sole in Subarea 4. History of landings; the official reported landings are presented by country and total. Official reported BMS landings, ICES estimated landings, and the TAC are presented. All weights are in tonnes.

Year	Belgium	Denmark	France	Germany	Netherlands	UK	Other	Total landings	Official BMS landings	ICES total landings	TAC
1982	1900	524	686	266	17686	403	2	21467		21579	21000
1983	1740	730	332	619	16101	435	0	19957		24927	20000
1984	1771	818	400	1034	14330	586	1	18940		26839	20000
1985	2390	692	875	303	14897	774	3	19934		24248	22000
1986	1833	443	296	155	9558	647	2	12934		18201	20000
1987	1644	342	318	210	10635	676	4	13829		17368	14000
1988	1199	616	487	452	9841	740	28	13363		21590	14000
1989	1596	1020	312	864	9620	1033	50	14495		21805	14000
1990	2389	1427	352	2296	18202	1614	263	26543		35120	25000
1991	2977	1307	465	2107	18758	1723	271	27608		33513	27000
1992	2058	1359	548	1880	18601	1281	277	26004		29341	25000
1993	2783	1661	490	1379	22015	1149	298	29775		31491	32000
1994	2935	1804	499	1744	22874	1137	298	31291		33002	32000
1995	2624	1673	640	1564	20927	1040	312	28780		30467	28000
1996	2555	1018	535	670	15344	848	229	21199		22651	23000
1997	1519	689	99	510	10241	479	204	13741		14901	18000
1998	1844	520	510	782	15198	549	339	19742		20868	19100
1999	1919	828	n/a	1458	16283	645	501	21634*		23475	22000
2000	1806	1069	362	1280	15273	600	539	20929		22641	22000
2001	1874	772	411	958	13345	597	394	18351		19944	19000

Year	Belgium	Denmark	France	Germany	Netherlands	UK	Other	Total landings	Official BMS landings	ICES total landings	TAC
2002	1437	644	266	759	12120	451	292	15969		16945	16000
2003	1605	703	728	749	12469	521	363	17138		17920	15850
2004	1477	808	655	949	12860	535	544	17828		18757	17000
2005	1374	831	676	756	10917	667	357	15579		16355	18600
2006	987	582	714	475	8299	912	36	12004		12594	17670
2007	973	413	591	458	10364	1208	5	14011		14635	15000
2008	1379	501	574	514	9456	851	16	13290		14071	12800
2009	1368	476	910	555	9606	952	1	13867		13952	14000
2010	1268	406	630	537	8770	943	2	12556		12603	14100
2011	864	347	566	327	8137	820	2	11063		11485	14100
2012	607	418	634	440	9085	610	3	11797		11602	16200
2013	706	497	687	561	9967	870	1	13290		13137	14000
2014	966	314	675	642	9018	843	0	12458		13060	11900
2015	935	271	542	765	9273	813	0	12598		12867	11900
2016	768	355	362	861	9600	706	0	12652		14127	13262
2017	557	433	393	761	9482	514	0	12139^	30	12370	16123
2018	404	368	432	721	8581	432	3	10939^	57	11199	15694
2019	253^	110	108	619^	6914^	333^	1	8339^	47	8647	12555
2020	240^	123	37	920^	6707^	542^	0	8569^	5	8863	17545

* These totals do not include reported official landings of all countries.

** Preliminary reported official landings.

^ Including BMS landings.

n/a = not available

Summary of the assessment

Table 9 Sole in Subarea 4. Assessment summary. Recruitment in thousands, weights are in tonnes. High and low are 2 standard deviations.

Year	Recruitment			Spawning–stock biomass			Landings [§]	Discards [§] , ^*	Catch [§] , ^	Fishing mortality		
	(Age 1)	High	Low	SSB	High	Low				F (ages 2–6)	High	Low
1957	138137	161814	117924	65745	74418	57072	12067	765	12064	0.21	0.26	0.173
1958	124119	145794	105667	68162	77038	59286	14287	753	14284	0.21	0.24	0.183
1959	440207	520069	372609	71890	80509	63271	13832	981	13829	0.22	0.25	0.188
1960	40579	48226	34144	74847	83614	66080	18620	1534	18618	0.26	0.29	0.22
1961	65644	77692	55464	106950	118285	95615	23566	2854	23564	0.31	0.35	0.27
1962	10646	12619	8981	89727	99015	80439	26877	1562	26875	0.33	0.38	0.29
1963	12340	14591	10436	72381	80328	64434	26164	758	26161	0.31	0.35	0.27
1964	590072	710891	489787	54265	61403	47127	11342	303	11339	0.29	0.33	0.24
1965	147267	183869	117950	43969	51156	36782	17043	1952	17040	0.29	0.33	0.25
1966	58630	75998	45231	105140	119505	90775	33340	4514	33337	0.33	0.38	0.28
1967	97831	133543	71669	104470	115582	93358	33439	2696	33436	0.41	0.46	0.35
1968	133653	185907	96086	92616	101943	83289	33179	2251	33176	0.50	0.57	0.44
1969	86595	117004	64090	71403	78878	63928	27559	2730	27556	0.55	0.63	0.47
1970	198789	268026	147438	64885	72004	57766	19684	2448	19681	0.52	0.59	0.46
1971	57815	76728	43564	55621	61820	49422	23652	2809	23649	0.49	0.57	0.42
1972	119611	159331	89793	63699	71177	56221	21087	2289	21083	0.52	0.58	0.46
1973	154972	199398	120444	47266	52627	41905	19308	2030	19304	0.56	0.63	0.49
1974	121905	154517	96176	46484	51739	41229	17990	2505	17986	0.55	0.62	0.49
1975	60658	76393	48164	48190	53802	42578	20773	2277	20769	0.51	0.57	0.45
1976	149492	193428	115536	47368	52204	42532	17326	1753	17322	0.48	0.54	0.42
1977	185721	244273	141204	38478	41996	34960	18003	2013	18000	0.48	0.53	0.42
1978	62255	79680	48641	44399	49564	39234	20280	3072	20276	0.49	0.56	0.42
1979	17158	21926	13426	52828	58741	46915	22598	2228	22594	0.51	0.56	0.45
1980	188528	242384	146638	40157	43935	36379	15806	1026	15802	0.52	0.58	0.47

Year	Recruitment			Spawning–stock biomass			Landings [§]	Discards [§] , ^*	Catch [§] , ^	Fishing mortality		
	(Age 1)	High	Low	SSB	High	Low				F (ages 2–6)	High	Low
1981	246471	329220	184521	26815	29004	24626	15403	1938	15399	0.55	0.60	0.49
1982	213203	287052	158353	38826	44263	33389	21578	4234	21574	0.58	0.64	0.51
1983	195634	258549	148028	51811	59617	44005	24927	4902	24923	0.61	0.69	0.54
1984	92226	119386	71245	51958	58450	45466	26839	4228	26836	0.63	0.69	0.57
1985	113437	142834	90090	47459	53133	41785	24248	2835	24244	0.63	0.70	0.55
1986	168721	211284	134732	38541	41784	35298	18201	2033	18197	0.59	0.65	0.54
1987	81634	100553	66274	34467	37810	31124	17368	2347	17365	0.54	0.60	0.49
1988	594217	722127	488964	41698	46156	37240	21590	2137	21586	0.50	0.55	0.45
1989	115036	138583	95490	37706	41135	34277	21804	4228	21801	0.47	0.52	0.43
1990	221904	267749	183909	108460	123206	93714	35121	5059	35117	0.46	0.51	0.41
1991	96182	118530	78048	85409	94141	76677	33514	3320	33510	0.46	0.50	0.42
1992	513497	643412	409815	84047	90979	77115	29341	2634	29338	0.49	0.54	0.44
1993	116658	151016	90117	58217	62566	53868	31491	5511	31488	0.53	0.58	0.49
1994	82537	106415	64017	88988	100582	77394	33002	5350	32999	0.59	0.65	0.53
1995	123995	159781	96225	67536	74360	60712	30468	3066	30465	0.65	0.71	0.59
1996	79618	100302	63200	41123	44580	37666	22650	2166	22647	0.69	0.75	0.63
1997	321258	408996	252342	33626	37227	30025	14902	2047	14899	0.70	0.76	0.63
1998	149343	192675	115756	24543	26896	22190	20867	3858	20865	0.67	0.73	0.62
1999	117243	147470	93211	47780	55740	39820	23475	4370	23472	0.65	0.72	0.58
2000	134188	166982	107835	39774	44269	35279	22641	3022	22639	0.64	0.70	0.59
2001	67306	81741	55419	33416	36665	30167	19944	2530	19941	0.64	0.69	0.58
2002	198789	240037	164629	32846	36053	29639	16946	1712	18658	0.61	0.66	0.56
2003	97343	117631	80555	25750	28049	23451	17921	1364	19284	0.57	0.61	0.52
2004	54339	66009	44732	38227	42894	33560	18757	2181	20938	0.55	0.60	0.49
2005	56613	69063	46408	31950	35056	28844	16355	1341	17696	0.55	0.59	0.50
2006	179333	213642	150534	25314	27266	23362	12594	994	13588	0.53	0.59	0.48
2007	67440	79896	56927	17997	19315	16679	14635	871	15506	0.48	0.52	0.44
2008	74982	89724	62662	32908	36666	29150	14071	545	14616	0.44	0.48	0.40
2009	96568	116883	79784	30180	32808	27552	13952	1261	15213	0.45	0.49	0.41
2010	180773	215641	151544	29099	31509	26689	12603	2246	14849	0.50	0.55	0.46
2011	174556	203149	149987	26757	29110	24404	11485	1703	13188	0.52	0.57	0.47
2012	46583	54151	40073	28825	31670	25980	12168	2528	14696	0.47	0.51	0.43
2013	90762	106855	77093	33067	35904	30230	13839	2119	15958	0.42	0.46	0.38
2014	154817	185650	129105	29169	31460	26878	13072	1568	14640	0.40	0.43	0.36
2015	111748	135625	92074	27564	29762	25366	12827	1763	14589	0.41	0.45	0.36
2016	64408	79321	52299	33064	36293	29835	14118	1205	15323	0.44	0.50	0.39
2017	133519	171021	104241	28847	31889	25805	12327	1246	13573	0.48	0.55	0.41
2018	106085	144857	77691	23340	26334	20346	11209	1056	12265	0.44	0.53	0.36
2019	414571	613589	280105	23413	27595	19231	8658	1949	10607	0.34	0.41	0.26
2020	48146	89051	26031	29141	35565	22717	8841	1649	10490	0.23	0.31	0.158
2021	113711**			64793								

* Since 2017, discards minus BMS landings from EU fleets officially reported in logbooks.

** Geometric mean (1957–2019).

§ Catches presented are the sum of product (SOP) values from catch and weight-at-age used in the assessment model.

^ Since 2002, discard estimates are raised from the observer programme. Discards prior to 2002 are reconstructed by the model and are not included in the total catch column.

Sources and references

- Aarts, G., and Poos, J. J. 2009. Comprehensive discard reconstruction and abundance estimation using flexible selectivity functions. *ICES Journal of Marine Science*, 66: 763–771. <https://doi.org/10.1093/icesjms/fsp033>.
- Brunel, T., and Verkempynck, R. 2018. Variations in North Sea sole distribution: variation in North Sea sole distribution with respect to the 56°N parallel perceived through scientific survey and commercial fisheries. Wageningen Marine Research report C087/18. <https://doi.org/10.18174/465031>.
- EU. 2018. Regulation (EU) 2018/973 of the European Parliament and of the Council of 4 July 2018 establishing a multiannual plan for demersal stocks in the North Sea and the fisheries exploiting those stocks, specifying details of the implementation of the landing obligation in the North Sea and repealing Council Regulations (EC) No 676/2007 and (EC) No 1342/2008. *Official Journal of the European Union*, L. 179. 13 pp. <http://data.europa.eu/eli/reg/2018/973/oj>.
- EU. 2019. Regulation (EU) 2019/1241 of the European Parliament and of the Council of 20 June 2019 on the conservation of fisheries resources and the protection of marine ecosystems through technical measures, amending Council Regulations (EC) No 1967/2006, (EC) No 1224/2009 and Regulations (EU) No 1380/2013, (EU) 2016/1139, (EU) 2018/973, (EU) 2019/472 and (EU) 2019/1022 of the European Parliament and of the Council, and repealing Council Regulations (EC) No 894/97, (EC) No 850/98, (EC) No 2549/2000, (EC) No 254/2002, (EC) No 812/2004 and (EC) No 2187/2005. *Official Journal of the European Union*, L. 198: 105–201. <http://data.europa.eu/eli/reg/2019/1241/oj>.
- ICES. 2018. Report of the Working Group on Electric Trawling (WGELECTRA), 17–19 April 2018, IJmuiden, the Netherlands. *ICES CM 2018/EOSG*: 10. 155 pp.
- ICES. 2020a. Benchmark Workshop for Flatfish stocks in the North Sea and Celtic Sea (WKFlatNSCS). *ICES Scientific Reports*, 2:23. 966 pp. <http://doi.org/10.17895/ices.pub.5976>.
- ICES. 2020b. Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK). *ICES Scientific Reports*, 2:61. 1353 pp. <http://doi.org/10.17895/ices.pub.6092>.
- ICES. 2021a. Advice on fishing opportunities. In Report of the ICES Advisory Committee, 2021. *ICES Advice 2021*, section 1.1.1. <https://doi.org/10.17895/ices.advice.7720>.
- ICES. 2021b. Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK). *ICES Scientific Reports*. 3:66. <https://doi.org/10.17895/ices.pub.8211>. *In prep.*

[Download the stock assessment data and figures.](#)

Recommended citation: ICES. 2021. Sole (*Solea solea*) in Subarea 4 (North Sea). In Report of the ICES Advisory Committee, 2021. *ICES Advice 2021*, sol.27.4. <https://doi.org/10.17895/ices.advice.7859>.